

**Commonwealth of Kentucky
Division for Air Quality**

PERMIT APPLICATION SUMMARY FORM

Completed by: Sukhendu K. Majumdar

GENERAL INFORMATION:

Name:	Air Products and Chemicals, Inc.
Address:	US 23, P.O. Box 1492 Catlettsburg, KY 41129
Date application received:	2/2/2007
SIC Code/SIC description:	2813, Industrial Gases
Source ID:	21-019-00117
Source A.I. #:	83915
Activity ID:	APE20070001
Permit:	V-07-008

APPLICATION TYPE/PERMIT ACTIVITY:

<input checked="" type="checkbox"/> Initial issuance	<input type="checkbox"/> General permit
<input type="checkbox"/> Permit modification	<input type="checkbox"/> Conditional major
__Administrative	<input checked="" type="checkbox"/> Title V
__Minor	<input type="checkbox"/> Synthetic minor
__Significant	<input checked="" type="checkbox"/> Operating
<input type="checkbox"/> Permit renewal	<input type="checkbox"/> Construction/operating

COMPLIANCE SUMMARY:

<input type="checkbox"/> Source is out of compliance	<input type="checkbox"/> Compliance schedule included
<input type="checkbox"/> Compliance certification signed	

APPLICABLE REQUIREMENTS LIST:

<input type="checkbox"/> NSR	<input checked="" type="checkbox"/> NSPS	<input checked="" type="checkbox"/> SIP
<input type="checkbox"/> PSD	<input checked="" type="checkbox"/> NESHAPS	<input type="checkbox"/> Other
<input type="checkbox"/> Netted out of PSD/NSR	<input type="checkbox"/> Not major modification per 401 KAR 51:001, 1(116)(b)	

MISCELLANEOUS:

- ☐ Acid rain source
- ☐ Source subject to 112(r)
- ☐ Source applied for federally enforceable emissions cap
- ☐ Source provided terms for alternative operating scenarios
- ☐ Source subject to a MACT standard
- ☐ Source requested case-by-case 112(g) or (j) determination
- ☐ Application proposes new control technology
- ☒ Certified by responsible official
- ☒ Diagrams or drawings included
- ☐ Confidential business information (CBI) submitted in application
- ☐ Pollution Prevention Measures
- ☒ Area is non-attainment (list pollutants): PM2.5 and Ozone.

EMISSIONS SUMMARY:

Pollutant	2006Actual (tpy)	Potential (tpy)
PM/PM ₁₀	0.7/0.7	15.2
SO ₂	0.024	1.2
NO _x	4.43	128.9
CO	12.64	99.5
VOC	4.71	31.2
Single HAP (Methanol)	NA	15.8
Source wide HAPs	NA	15.8

SOURCE DESCRIPTION:

The hydrogen plant, which is owned and operated by Air Products and Chemicals, Inc. provides “over the fence” hydrogen and steam to the Catlettsburg Refinery. Construction and operation of the hydrogen plant was authorized by the Division for Air Quality in the permit VF-02-001, which was issued to Catlettsburg Refining, LLC. Since the hydrogen plant is owned and operated by Air Products and Chemicals, Inc., both the source and Catlettsburg Refining, LLC prefer that the hydrogen plant be issued a separate Title V permit.

The hydrogen plant, operated by Air Products, produces hydrogen using steam methane reforming technology to supply hydrogen to the Marathon Petroleum Company’s Catlettsburg petroleum refinery. Natural gas is the methane source. Natural gas process feed and recycled hydrogen product are compressed, and then directed to the hydrogenator and desulfurization beds, where hydrogenation and desulfurization occur to remove trace amount sulfur from the natural gas to prevent poisoning of reformer catalyst. The beds contain zinc oxide catalyst to adsorb any sulfur compound to form zinc sulfide. When the catalyst becomes spent, it is removed and disposed off. Steam is mixed with the desulfurized gas and the mix is directed to the reformer.

The reformer contains catalyst filled tubes in which reactions occur. The mixed feed is converted into hydrogen and a mixture of carbon oxides. The syngas effluent from the reformer tubes is cooled and enters the high temperature shift reactor where any CO in the gas is converted to CO₂. The syngas out of the reactor is purified in the multi-vessel pressure swing adsorption unit where the impurities are adsorbed allowing high purity hydrogen to pass through. The hydrogen plant uses a flare to burn excess hydrogen during the refinery hydrogen demand curtailment and during the startup, shutdowns, non-emergency process upsets and malfunction, and maintenance.

Following are the five (5) emission points in the hydrogen plant.

Emission Point, EP-01: Reformer Flue Gas Stack

Emission Point, EP-02: Condensate Stripper Vent

Emission Point, EP-03: Emergency Vent Flare

Emission Point, EP-04: Plant Wide Fugitive emissions

Emission Point, EP-05: Plant Wide intermittent and continuous steam vent

SINGLE SOURCE DETERMINATION:

The hydrogen plant, operated by Air Products, produces hydrogen using steam methane reforming technology to supply hydrogen and steam only to the Marathon Petroleum Company's Catlettsburg petroleum refinery. Marathon Petroleum Company's Catlettsburg refinery is a PSD major source for regulated pollutants. Air Products' hydrogen plant is within the property limit of Marathon's refinery. Together they are considered by the Kentucky Division for Air Quality to be a single "major source" as defined in 401 KAR 52:001, Section (1)(45)(b), definition of Major source for regulated air pollutants other than HAPS. Each owner/operator is responsible and liable for their own violations unless there is a joint cause for the violations.

EMISSIONS AND OPERATING CAPS DESCRIPTIONS:

None

OPERATIONAL FLEXIBILITY:

None